***Jorge Parras, MD**

*Instituto de Cardiologia de Corrientes
Bolivar 1334
Corrientes
Argentina
E-mail: jorgeparras@yahoo.com

doi:10.1016/j.jacc.2012.02.037

REFERENCES

1. Lancellotti P, Magne J, Donal E, et al. Clinical outcome in asymptomatic severe aortic stenosis: insights from the new proposed aortic stenosis grading classification. J Am Coll Cardiol 2012;59:235–43.
2. Kang DH, Park SJ, Rim JH, et al. Early surgery versus conventional treatment in asymptomatic very severe aortic stenosis. Circulation 2010;121:1502–9.
3. Flachskampf FA, Kavianipour M. Varying hemodynamics and differences in prognosis in patients with asymptomatic severe aortic stenosis and preserved ejection fraction: a call to review cutoffs and concepts. J Am Coll Cardiol 2012;59:244–5.

Reply

We would like to thank Drs. Guntheroth and Parras for their interest in our study, which underlined that the assessment of aortic stenosis (AS) severity should integrate the flow-gradient pattern to the classic measurement of aortic valve area (1). The reason is that most of the echocardiographic parameters used to assess the severity of AS are flow dependent. As a general rule, a low transvalvular gradient (<40 mm Hg) or velocity (<4 m/s) does not exclude the presence of a severe AS in patients with small aortic valve areas and preserved left ventricular (LV) ejection fraction. In addition, a preserved LV ejection fraction (>50%) does not exclude the presence of myocardial systolic dysfunction and low transvalvular flow in AS. Such rules are also applicable to congenital AS, particularly when concomitant aortic regurgitation exists (2).

In daily practice, the discrepancy between gradient and aortic valve area may potentially lead to an underestimation of AS and symptom severity and therefore to an inappropriate delay of aortic valve replacement (AVR). Unless related to concomitant valvular (mitral or aortic) regurgitation, potential causes for these discordances include: 1) measurement errors; 2) small body size; 3) paradoxical low-flow AS; and 4) inconsistent grading related to intrinsic discrepancies in guideline criteria. As a first step, the best rule of the thumb is to confirm the low-flow state using volumetric approaches (2- or 3-dimensional echocardiography). If the stroke volume measured by these independent methods is consistent with the stroke volume measured using the LV outflow tract, one can be reassured of the accuracy of the measurement of stroke volume. Such a low-flow state represents a witness of intrinsic myocardial dysfunction and a more advanced disease process. It could be associated with either high-gradient or low-gradient AS.

In our study, all patients were regularly followed in our outpatient heart valve clinic. Both soft and hard events were considered in a composite end point defined as cardiovascular death or need for AVR motivated by the development of symptoms or LV dysfunction. This eliminates bias related to the inclusion of AVR not dictated by symptoms. As mentioned by Dr. Parras, there are some discrepancies in the hazard ratios reported in the "Results" section of the report and in Table 4 [1]. Nevertheless, these differences did not affect the interpretation of the results. In fact, such differences are explained by different multivariate models used in the 2 sections. According to the statistical review, it was suggested, to avoid overfitting of the models, not to include variables with high degrees of colinearity. These changes were reported in Table 4 [1], but not in the text, in which the multivariate model including all variables was provided. Peak aortic velocity and mean aortic gradient are closely and directly correlated. Therefore, it may be difficult to admit that those variables predict events in a contradictory fashion. However, this reflects the statistical models used. The normal-flow low-gradient entity represented the referent group. This is the reason why the peak aortic velocity or the low-flow pattern predicted the outcome compared with the referent group. However, outcome prediction was more significant in the low-flow low-gradient entity. These results were obtained even if the incidence of the low-flow low-gradient AS pattern was low. Of note, 82% of patients in this category experienced cardiac events during follow-up. Furthermore, chance has no role to play in these results.

The outcomes of patients with low-flow high-gradient AS are nearly identical to those of patients with normal-flow high-gradient AS. When symptomatic, AVR is the only therapy that can significantly improve functional capacity, symptoms, and survival. Paradoxical low-flow low-gradient AS conveys the poorest outcome, even in asymptomatic patients. In this entity, though the benefit of surgery is not proven, AVR may probably be beneficial in selected patients. Of note, even if the data reported by Kang et al. (3) are not applicable to this category, they suggest that early AVR may improve survival. However, before considering surgery, symptoms should be matched to the severity of AS.

***Patrizio Lancellotti, MD, PhD**
Julien Magne, PhD

*University Hospital Sart Tilman
Department of Cardiology
B-4000 Liege
Belgium
E-mail: plancellotti@chu.ulg.ac.be

doi:10.1016/j.jacc.2012.02.039

REFERENCES

1. Lancellotti P, Magne J, Donal E, et al. Clinical outcome in asymptomatic severe aortic stenosis: insights from the new proposed aortic stenosis grading classification. J Am Coll Cardiol 2012;59:235–43.
2. Morgan BC, Guntheroth WG, Baum D, Merendino KA. Reassessment of operative indication for moderate congenital aortic stenosis. J Thorac Cardiovasc Surg 1965;49:150–8.
3. Kang DH, Park SJ, Rim JH, et al. Early surgery versus conventional treatment in asymptomatic very severe aortic stenosis. Circulation 2010;121:1502–9.

Reply

We thank Dr. Guntheroth for his interest in the paper by Lancellotti et al. (1) and our editorial (2). He emphasizes the use of mean gradient and aortic valve area, as opposed to peak gradient, in managing aortic stenosis. The cited report from 1965 (3), which Dr. Guntheroth coauthored, allows a fascinating glimpse into predigital cardiology using analog pressure tracings, when determining a mean as opposed to a peak transaortic gradient involved "special equipment" and considerable additional work. The investigators demonstrated that spikes in left ventricular